VST Mastering Tutorial

A common problem with many mixes is the lack of headroom. This arises because of the confusion about Volume Units (dBu) and Digital Full-Scale (dBFS).

If 0dBu = -18dBFS (European standard) then it would be beneficial to solo your drum group so that you start your mix with a drum group peak-meter reading between -25dBFS to -22dBFS. As you balance the individual percussion elements you have 3dBFS to play with. As you add the other instruments the peak-meter on the master channel will show that you are quickly going beyond -22dBFS. It is perfectly acceptable to see a figure of -15dBFS on the master channel meter at the end of a mix.

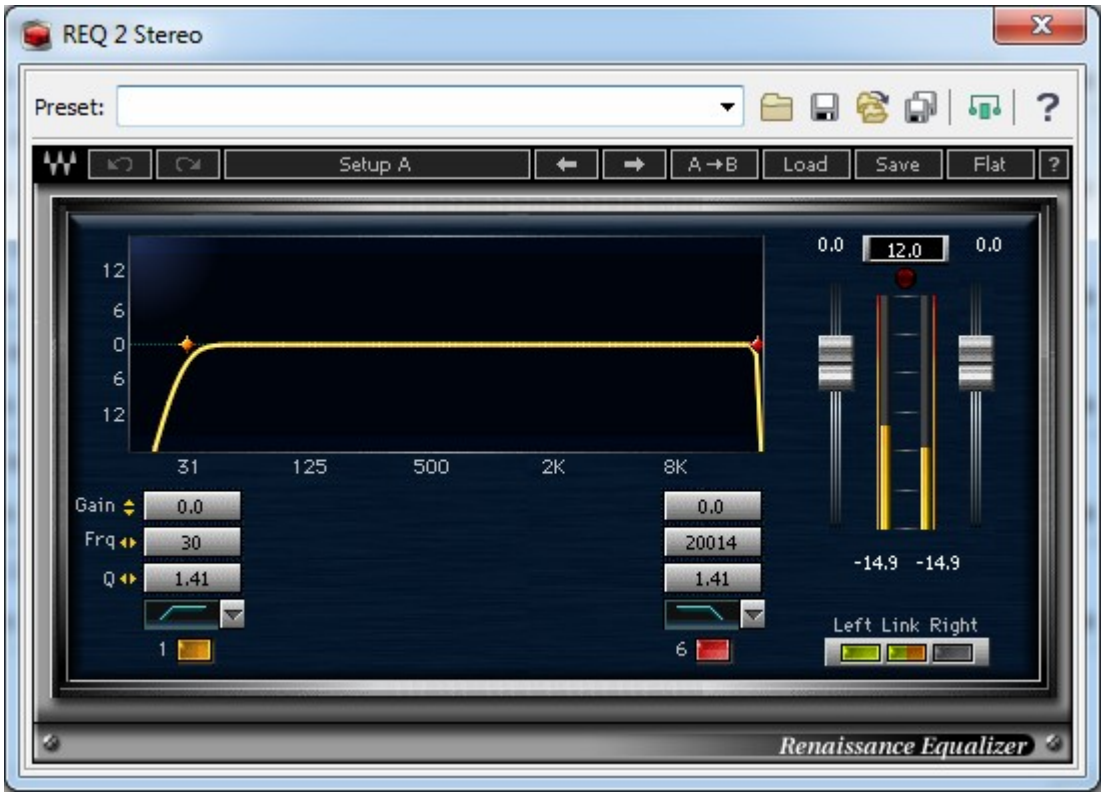
In some instances a final mix may reach -12dBFS on the master channel meter but any more than that and you are using up valuable headroom that the mastering process needs.

The art of mixing is about balance. If you mix too loud because you are trying to make your final mix sound like a mastered track then you may have created problems for the mastering engineer. Aim for balance, clarity and cohesion between musical elements when you mix and leave the loudness for the mastering process. If you create EDM and find the drum group values too low as a starting point then set the drum group channel so that its peak-meter reads -18dBFS. This is an acceptable starting point for a drum group since 0dBu = -18dBFS and you can choose to go a little above that value for impact.

Export your final mix as a 24bit wav file. Load your track into an audio editor like Sound Forge. It is recommended that you do not use your DAW to master. Sound Forge is designed for preparing masters and your DAW is designed for creating mixes. The benefits of mastering using the plugin chainer of Sound Forge will become immediately obvious.

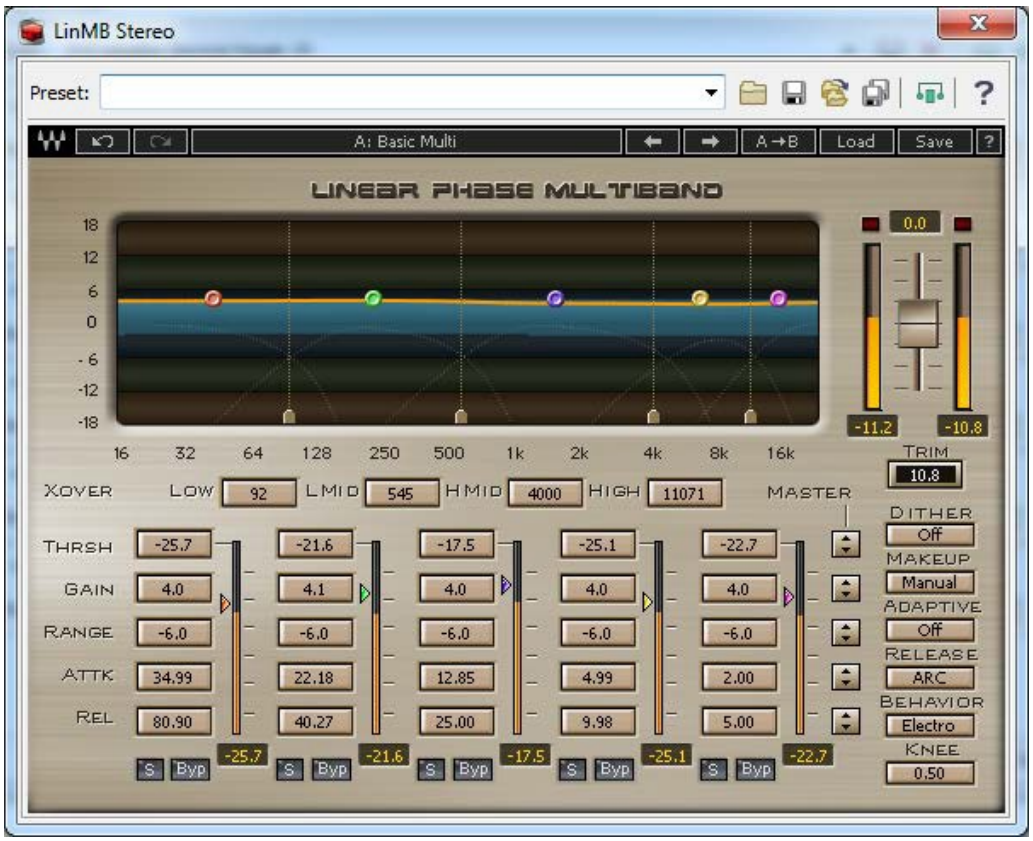
First set up the chain of plugins in the order shown below. Do not process your mix by using one plugin at a time. A plugin chainer links all the plugins and unlocks the power that professional mastering engineers rely on. There are many online tutorials on how to set up a mastering chain in Sound Forge and once you have created your first mastering chain you can save it as a template for further projects. You can now start mastering.

1. Waves REQ2: The first plugin is a 2-band EQ with a low and high cut applied. The low cut is necessary to remove unwanted low frequencies. Anything lower than 30Hz can be thrown out of the mix. Set the values as shown below and leave the gain on the master channel at zero. It is too early to raise the loudness of the mix and there are better plugins in the mastering chain for this task. The Wave REQ2 is an ideal EQ for this first step because of its analog warmth.



"Waves Renaissance Equalizer REQ2 with a low cut at 30Hz and a high cut at 20kHz"

2. Waves LinMB: You now apply a multiband compressor over your entire mix. Before you pass your track through the LinMB you must bypass all the plugins until this step is finished. Leave the REQ2 on since it is that signal that we wish to pass to the LinMB.



"Waves Linear Multiband compresses the mix to achieve more headroom"

Follow these steps:

Choose LinMB full reset from the Load menu.

Play your mix in real-time until the end.

Enter the value at the bottom of each meter into the threshold field.

Turn off Dither and put Makeup on manual. LinMB dithering is not needed in Sound Forge since the program returns floating-point 32bit data back. (See Dither section of the Waves LinMB manual)

Now return to the Load menu and try out some of the presets. If you are mixing and mastering on five-inch monitors then the BassComp/De-Esser preset may be useful. The LinMB manual section on the BassComp/De-Esser preset states:

"The most common problem with small studio mixes is the low end, due to near-field monitors...."

The BassComp/De-Esser preset is ideal for checking the low end of five-inch near-field monitor mixes.

Do not hit the Trim button. The limiter at the end of the chain is the preferred plugin for increasing loudness. The Trim button will leave no headroom for the following plugins. If you wish to gain up your mix at this stage then manually raise the output by two or three dB.

3. Waves Q10 EQ: Now you have to check for formants using headphones. Formants are frequency problems that result in high-pitched whistles. These whistles are difficult to hear on monitors but are easily revealed by headphones. Switch on Band 10 and set the Q to 60 (or above) which will create a notch. Hold the Ctrl button as you grab the yellow marker of Band 10 and drag all the way up. Release and repress the Ctrl button to sweep the top frequencies right to left. If you hear a whistle then stop at that frequency and release and repress the Ctrl button and drag the yellow marker down so that the gain is showing a value between -3dB to -6dB. Because you are working on a broadband audio file it is best to adopt conservative values when gaining down a formant. You can try -7dB or above for howling whistles but always bear in mind you are adjusting a broadband mix. Formants tend to be audible at the frequencies of 2kHz, 4kHz and 8kHz. Enable other bands if you have more formants to gain down. Be aware that a mix may have no formants.

If you find no formants then the Q10 EQ can be used for another purpose. From the Load menu choose the Q10 Full Reset preset. Enable Band 6 which defaults to 1000Hz and set the Q value to 2 or 3. To add some "air" to a final mix boost between 1200Hz to 1500Hz using a gentle gain of +0.1dB to +0.3dB.

4. BBE D82 Sonic Maximizer: Now you may use an exciter to add harmonics and to contour the bass. The BBE plugin has two mastering presets. It is important to note that an exciter can have a profound impact on your mix. Starting from the two mastering presets it is recommended that the Process and LO Contour be adjusted down. To hear the processed signal check that the green Out light is on. At the end of your mastering session it is recommended that you bounce out two masters - one with BBE and one without. A benefit of using a mastering chain is that you can bypass a plugin and bounce again immediately for comparison.

"BBE D82 Sonic Maximizer adds harmonics to the mix"

5. Brainworx bx Digital: You can now use a mastering equalizer to mono the low frequencies. You enable the Mono-Maker wheel in the center of the bottom row by entering a value of 60Hz. The manual says that you can safely mono between 80Hz to 100Hz for most genres but a lower value of 60Hz is a good starting point. The next process you can try is widening the stereo field. It is best to be cautious and only widen the stereo field by 5% or 10%. If you have spent time placing your elements then stereo widening can drastically alter your mix for the worse. It is a good idea to check the individual elements in your mix when using stereo widening. Other times stereo widening can open up a mix and reveal details that were hidden so it is always a process you should try on every mix.

"Brainworx bx digital Mono-Maker is used to mono the bass frequencies"

6. Waves L3-LL Ultramaximizer: At the end of the mastering chain is the limiter which is used to raise the overall volume of the mix. The IDR dither section is used to convert your 24bit file to a 16bit file and is the final process applied to your mix.

"Waves L3-LL Ultramaximizer makes the mix louder"

If you read the manual it instructs you to set the Out Ceiling to zero and to move the Threshold down until the Attenuation strip lights up red. The manual then says to keep dragging the threshold downward until your mix degrades in audio quality. That is the point at which you pull back on the threshold so that the mix is at its loudest without degradation. Then the manual tells you to set the headroom of the Out Ceiling to -0.2dBFS. This will produce a very loud master with no headroom left. The L3 can apply high amounts of attenuation before degradation occurs and this may not be suitable for your mix.

For pop releases a professional mastering engineer may choose to leave a bit more headroom. It is not uncommon to see the Out Ceiling set at -1.5dBFS for pop releases which leaves some headroom for radio play.

At the other end of the spectrum it is also common to find EDM releases with a severely clipped waveform displayed which is the result of extreme attenuation with the Out Ceiling set to zero. The choice is yours and there is no reason to attenuate at all. If you wish to keep the dynamics of a performance, especially of an acoustic performance, then attenuation may be counter-productive. The L3 is perfectly capable of raising the volume of your mix without attenuation. If you wish to preserve the dynamics of a performance set the Out Ceiling to -2dBFS and lower the threshold until the attenuation strip lights up red to 1dB or 2dB. Lower the threshold a small amount until the attenuation strip is barely lighting up. The choice is yours and you will have to judge whether you want to attenuate to 3dB or to simply increase the volume without seriously affecting the dynamics.

The IDR section should be set to:

Quantize: 16 Bits
Dither: Type 1
Shaping: Normal

The settings above are from the manual and are recommended for most uses. The Ultra shaping profile is for high quality studio masters. Most home musicians are not working with expensive equipment and therefore Normal shaping is recommended.

If you find that your mix still needs to be louder you can try gaining up the Q10, D82 and Brainworx plugins by a few dB or you could try a more aggressive attenuation with the L3. There is also the Trim button of the LinMB. The great thing about a plugin chainer is that you can keep coming back to make changes to each plugin. Remember to save your plugin chain.